SOCIO-ECONOMIC AND ENVIRONMENTAL ASSESSMENT FOR LAND AND RESOURCE MANAGEMENT PLANNING IN BRITISH COLUMBIA

GUIDING PRINCIPLES

B.C. Ministry of Sustainable Resource Management

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1.0 INTRODUCTION

The purpose of a socio-economic and environmental assessment (SEEA) is to provide plan architects, stakeholders and decision makers with three types of socio-economic information:

1. Background information on the socio-economic structure of the plan area and its communities, including an inventory of land and marine based resources which are, or could be, important to the area and/or province;

2. A description of the key socio-economic parameters that may be impacted by resolution of the resource use management issues to be addressed by the plan; and

3. An assessment of the expected socio-economic impacts of the plan and /or alternate management scenarios relative to a base case (usually the "status quo") scenario.

The need for, or emphasis on, each of these three categories of information will depend upon the size of the plan area, the scope of the planning initiative and the process to be followed in establishing a land and resource management plan. Consensus based planning may have greater need for extensive background information, than a consultative approach.

The background information establishes the socio-economic and environmental context for the assessment of the land and resource management options. Some effort should be made to limit the background information to indicators that will be useful in assessing alternate resource use options.

The SEEA should inform, but not drive the planning process, should be value neutral and above all else, must assist consensus builders or decision makers in understanding the trade-offs involved in different management scenarios. The Guiding Principles that follow are primarily concerned with the plan or scenario assessment phase of the SEEA process.

Land and Resource Management Plans (LRMPs) cover relatively large areas of the province, typically the size of the Timber Supply Areas. Landscape Unit Planning and other plans for smaller areas such as the Sustainable Resource Management (SRM) Plans cover smaller areas. These Guiding Principles are relevant for all levels of land and coastal use plans, however, the size and scope of the plans will dictate the required depth and comprehensiveness of the analysis.

Analysts should use these Guiding Principles (and the accompanying Guidelines) as resource documents when carrying-out socio-economic and environmental assessments.

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2.0 GUIDING PRINCIPLES

2.1 Methods of Analysis

The socio-economic and environmental implications of land and resource management plans and/or scenarios can be assessed from a number of perspectives:

1. Benefit-cost analysis estimates the differences in net value of the market and non-market outputs generated by the plan and/or each scenario from a pure "economic efficiency" or "net resource value" perspective.

2. Environmental risk assessment estimates the changes in likelihood of adverse environmental impacts resulting from human activities.

3. Economic impact analysis estimates impacts of the plan and/or scenarios on income and employment within specific communities, regions, or the Province as a whole.

4. Social impact analysis identifies and evaluates impacts of the plan and/or scenarios on demographic, local government and community concerns.

The first two perspectives deal with net changes in total social welfare, while the second two deal with the distribution of expected social and economic costs and benefits.

Each of these perspectives alone addresses only specific aspects of the consequences of the plan or management scenarios under consideration. SEEAs must review the complete array of impacts from the plan and/or each management scenario and present the information in tabular or matrix format to facilitate the review of the information by decision makers.

SEEAs must demonstrate the advantages and disadvantages of the plan and/or each management scenario and assist decision makers and stakeholders in weighing any trade-offs involved. The SEEA may use weighting and ranking techniques to help demonstrate differences in expected outcomes between scenarios. Trade-off analyses may go a step further than the SEEA and involve an analyst eliciting value judgments from interested parties on what they believe are appropriate trade-offs or weights placed on different plan objectives (e.g. Should access management planning designed to improve the co-existence of industrial activities, wildlife habitat, commercial tourism and recreation put more emphasis on one value than another?).

2.2 Defining Land Use Options

The planning process must provide a land and resource management plan and/or scenarios (including a base case scenario) to the analysts for assessment. These must be based on an understanding of both the resource potential of the land base, the interests of communities in the Plan Area, as well as broader provincial interests.

Biophysical mapping, resource analysis and public consultation are required to ensure that the plan and/or management scenarios encompass the range of values and alternative uses that reflect community and provincial interests.

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To facilitate their evaluation and comparison, relatively few (e.g., up to four including the base case) management scenarios should be specified for analysis and they should be different enough from one another to facilitate meaningful comparisons.

The assessment of the environmental and socio-economic implications of different management scenarios or land use options requires a comparison of what might occur under those scenarios relative to a base case, i.e. the "default" land and resource management regime that is most likely to be in place in the absence of a strategic land use plan. Therefore, a necessary step in the planning process is to define and document base case management and then assess its associated past and anticipated future socio-economic and environmental trends (including the propensity of resource use conflict in the plan area to frustrate the realization of socio-economic and environmental values). The presumed base case management regime must be applied consistently to all economic sectors and other values under consideration.

In most cases, the base case should essentially be the "status quo" including any recent regulations, and assuming that external factors such as commodity prices, regulatory policy and treaty negotiations follow pre-determined trends or remain the same. In some cases, difficulties may be encountered in distinguishing between forecast base case impacts, and impacts resulting from the plan or alternative management scenarios. For example:

- There may be "de facto" protected areas restricting certain types of development under the base case, which are given official Protected Area status under a new management plan. Care must be taken to assess and assign only those impacts that are related to the incremental change in management. For example, timber harvesting impacts should not be assigned if the area in question was already specifically excluded from timber supply modelling in recent Timber Supply Reviews.
- The base case may include a broad area strategic plan or higher level plan, which provides general management direction that is made more explicit under the new landscape unit plan scenario being assessed. Determining whether an expected impact is the result of the broad area strategic plan included in the base case, or is more appropriately deemed to result from the new landscape unit level plan, can be difficult.

2.3 Framework for Data Review and Presentation

There has been much discussion regarding ways to structure data gathered on the potential uses of plan area resources. These Guiding Principles recommend focusing on the following main areas of research.

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Table 1: Proposed Research Areas and Key Indicators

Main Area of Research	Key Indicators
Economic Development (regional and provincial level) by sector	Expected economic activity including indicators such as number of existing jobs, potential number of jobs, indirect and induced jobs, income, etc.
Social (mainly regional) – includes local communities and aboriginal communities	Expected impacts on population, income levels and general well being
Net Resource Value (mainly provincial) by sector (e.g. forestry, mining, oil and gas, energy, tourism, recreation, and environment) The net resource value should consider existing and potential commercial and non-commercial sectors that depend on the resource	For commercial sectors: product prices before tax less production costs (economic rent); in addition, any estimated economic rent captured by labour For non-commercial sectors: some measure of consumer surplus i.e. what people would be willing to pay for the activity or amenity above what they are paying
Environmental (provincial and regional)	Risk levels associated with different scenarios and qualitative measures of outcomes on key indicators; estimates of monetary values where possible to compare with the Net Resource Value account
Specific Aboriginal Concerns (Aboriginal issues should be mainly addressed in the Economic Development and Social areas of research)	Specific Aboriginal concerns that cannot be discussed in the Economic Development and Social areas of research
Government Finances (may be incorporated in economic development)	Government Revenues

Each main area of research should be reviewed at the Local Impact Area level and at the Provincial level.

Analysts should define the Local Impact Area after having identified the sectors and communities that directly and heavily depend on the Plan Area resources. The Local Impact Area boundaries often correspond to the Plan Area boundaries, however, this is not always the case. When a Plan Area is relatively small, many of the impacts of a land use plan are likely to flow outside the Plan Area into adjacent communities and ecosystems and the Local Impact Area will be larger than the Plan Area.

2.4 Current and Future Economic Development

An important task of the socio-economic impact assessment is to describe the current and future economic sectors that do, or will, depend on the resources in the Plan Area. In most land use Plan Areas, these will include some form of forestry activity (e.g., harvesting, processing, silviculture). Other resource-dependent industries or activities could include: agriculture, aquaculture, commercial fishing, guiding, mineral/petroleum exploration and extraction, energy production, trapping, tourism, and botanical forest products.

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Describing the current and future economic sectors that depend on the Plan Area resources typically involves estimating the direct income and employment that depends on the resources from the Plan Area. Indirect and induced income and employment effects are also estimated based on commonly used multipliers for that sector. There are a number of issues relating to the definition and description of the economic activities relying on Plan Area resources as summarized following:

2.4.1 Current Economic Activity - Direct Jobs and Income

The existing jobs and income reflect the current economic base. Data need to be collected on the direct jobs and income associated with each economic sector that depends on the land based resources in the plan area. To aid in the assessment of impacts expected from the plan and/or each scenario, the current jobs and income should be estimated per unit of output (e.g. per m3 of wood harvested), for those sectors that will likely be impacted by the land use plan.

2.4.2 Current Economic Activity - Indirect and Induced Jobs and Income

Indirect employment and income (from providing supplies and services to a given sector) and induced employment and income (from the sale of goods and services to direct and indirect employees) also play an important economic development role in plan areas and the province. Employment and income in most B.C. communities are heavily dependent on crown land resources whether the region relies on forestry, mining, tourism or agriculture. There are some issues related to using employment and income multipliers for estimating associated indirect and induced employment and income. These include:

- Multipliers do not reflect the ability of communities to adjust to changes in the economic base.
- Multipliers are linear and as a result do not recognize threshold effects (i.e. at the margin, a small change in harvest level could be sufficient to result in a mill closure or could have very little impact on employment).
- Economic Base Multipliers (or impact ratios) are derived from assumptions regarding which sectors are basic to a region (those that depend on local resources) and non-basic (those that depend on the basic sectors), assumptions that are not always valid.
- While multipliers differentiate between the indirect impacts (those from purchases of goods and services) and the induced impacts (those from the re-spending effects), there is some debate as to the relevance of including induced impacts in the SEEAs of land use options.
- At the provincial level, income changes in one plan area frequently represent only the redistribution of base activity between Plan Areas, with little or no change for the province as a whole. For example, reduced tourism activity in one area due to a newly designated Protected Area may be offset by increased activity in another region. In the short term, foregone timber values may also have only a limited impact on the sawmilling sector if another provincial region is able to increase its production. In other cases, however, the lost opportunities associated with reduced tourism potential, the protection of a specific mineral deposit or foregone timber values, would result in an overall loss of activity at the provincial level, which could justify the need for provincial level multipliers, particularly if the economy is not at full employment.

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Using economic multipliers is a cost effective, albeit flawed methodology to estimate the indirect and induced effects of various economic sectors on a region and the impacts of changes to these sectors. A more costly alternative would be to survey firms that supply goods and services at the local and regional level and estimate the impacts of those jobs on the communities, as well as any threshold levels that may cause disproportional responses to changes in sector activity levels.

Analysts who choose to use economic multipliers at the Plan Area/ regional level or at the provincial level must recognize the limitations and shortcomings associated with them, and attempt to test the reasonableness of the indirect and induced impacts using survey methods and local knowledge of the economic sectors. Also, the results yielded by employment and income multipliers should be viewed as being very approximate.

2.4.3 Future Jobs and Income

The current jobs and income do not recognize the potential uses of the land resources. It is therefore important to attempt to forecast what the future uses of the resources might be and to recognize the risks and probabilities of potential activities occurring. Forecasting is very difficult for certain sub-surface values such as minerals and oil and gas, particularly when the area has not been comprehensively explored. Technological changes have been known to reveal new opportunities in areas that had been previously explored using old technologies (for example, diamond exploration). To recognize the forecasting difficulties, ranges of possible outcomes may be used to help indicate the nature and extent of uncertainty.

Difficulties in imagining and estimating future resource uses tend to bias the assessment of management plan impacts in favour of current economic activity. For example, the Economic Base models used to determine economic dependencies for a region may result in one sector, say the mining industry, being deemed somewhat irrelevant to a Plan Area when in fact, the region has significant mineral potential but no producing mines or substantive exploration activity. The SEEAs have made extensive use of GIS indicators to show the potential of sectors such as tourism, mining and oil and gas, that may not have a large (or any) current impact in a given plan area. Nevertheless, the difficulty in translating this potential into the Economic Base model has tended to bias the analysis in favour of the current economic base.

To the extent possible, the SEEAs need to quantify the potential socio-economic contributions that may reasonably be attributed to potential economic sectors or activities.

2.5 Net Resource Value

The Net Resource Value estimates measure the impact of the plan or each land management option on the Net Benefits realized from the land or marine based resources in the Plan Area. This includes resources used by the commercial sectors as well as non-commercial goods and services provided by the plan area resources such as recreation and environmental values.

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2.5.1 Net Benefits from Commercial Sectors

For commercial sectors, the net benefit (or economic rent) represents the above-normal financial returns from a commercial activity that occur as a result of the product or service generated by that activity being in relatively fixed supply relative to demand. Rent can accrue to the entrepreneur, be captured by the land and/or resource owner (government) or be incorporated in wages paid to labour. Rents are estimated as the total sales revenues (generally pre-tax) less all private and public costs of production, plus any portion of costs which are over and above the minimum payment required to attract and employ any of the factors of production (e.g. labour).
In theory, rents should be net of any external costs imposed upon third parties (e.g. environmental or social disturbances), but externalities can be difficult to monetize. At a minimum, the SEEAs should compare calculated rents which are gross of external costs, with the associated environmental and social disturbances in an effort to evaluate the degrees of co-existence achievable through alternate resource management scenarios.

The net benefit from commercial sectors should consider:

- **Public Sector Rent**: Government resource tax revenues are often used as a proxy for economic rents, for example stumpage revenues for the forest industry and oil and gas royalties and bonus bids in the case of the petroleum industry. In these instances, the government resource tax revenues are assumed to reflect product market prices less production costs (including a reasonable return on capital).
- **Rent Captured by Direct Labour**: Rent may accrue to labour, due to various labour market rigidities and "imperfections". Rent accruing to labour is very difficult to estimate and is perhaps best approximated by some fixed percentage of total direct labour costs for each sector.
- **Private Sector Rent Captured by Owners of Capital**: Rent may accrue to entrepreneurs who own or employ factors of production that are in relatively fixed supply. These rents are also very difficult to estimate, and can perhaps be best estimated by a percentage of total sales.

Rents accruing to labour and to entrepreneurs are very difficult to detect and quantify, but they should not be completely ignored. Relying solely on easily identified government resource tax revenues to compare the Net Benefits from various commercial sectors likely leads to an underestimate of the Net Benefits of sectors characterized by a large number of small producers.

A more equitable and practical approach may be to add a conservative proportion (say 5%) of gross sales revenue and total wage costs to government resource tax revenues to calculate the Total Net Benefit of a commercial sector.

The assessment of net benefits should include some recognition of the potential rents that may accrue from commercial activities that are not currently taking place in the plan area, but that might reasonably be expected to take place in the future.

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2.5.2 Net Benefit from Non-Commercial Activities

The benefits associated with non-commercial activities such as recreation and the benefits associated with environmental resources fall into two categories: use-related values (e.g. recreation, food gathering, air and fresh water) and existence-related values. Methods for estimating the net benefits associated with these values include:

1. Willingness to pay (which may be estimated through travel cost estimates, hedonic pricing models or contingent valuation surveys);

2. Avoided cost (e.g. clean up costs, water filtration facilities, value of changing health risks, etc.);

3. Choice experiments (where individuals can be asked to put a monetary value on a change in risks, to critical species for example); and/or

4. Value transfer utilizing indicators of the general magnitude of values from original research in other jurisdictions or from studies undertaken for other purposes.

Time and budget constraints will likely preclude undertaking original survey research on the value of non-commercial activities for any given planning exercise. The extent of the assessment of the Net Benefits from non-commercial activities will depend on the availability of readily available value estimates for the Plan Area, transferable value estimates from other studies, and the significance of these activities in the Plan Area.

2.5.3 Discount Rates and Net Present Values

The assessment of net economic value often requires net present value (NPV) calculations using discount rates, as it is important to recognize timing differences among benefits and costs.

In determining appropriate discount rates, there is a need to differentiate between the social opportunity cost of capital and the rate of social time preference. NPV calculations of industry revenues and other economic values should use the social opportunity cost of capital. NPV calculations of quantified environmental or social impacts should use the social time preference rate. The social opportunity cost of capital should be based on current long term borrowing costs less the expected long term inflation rate.

There are differences in opinion regarding which discount rates are appropriate in each situation. As a result, any NPV calculations must include sensitivity analysis to demonstrate the effect on calculated values of employing alternate discount rates.

There may be significant risk and uncertainty associated with the various estimates of Net Resource Values. To express the nature and extent of uncertainty, the analyst should estimate the most likely impact of each management scenario, along with a range of plausible outcomes. However, the range must be based on technically defensible data and methodology, and not simply unsubstantiated "best" or "worst" case estimates. Risks and uncertainties should not be taken into account through risk-adjusted discount rates.

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2.6 Environmental Assessment

Each land use option may impact the environmental resource values provided by a Plan Area. In broad terms, the benefits and values derived from environmental resources fall into two categories:

- Use-related values: the benefits derived from use of environmental resources or the human activity dependent on them (e.g. recreation, food gathering, air and water); and
- Existence-related values: the values attached to the existence and preservation of environmental resources because of their importance or perceived beauty (e.g. biodiversity, wildlife, etc.).

MSRM recommends a risk assessment approach for the evaluation of environmental impacts. This approach is outlined in more detail in the Ministry of Environment's (now Ministry of Water, Land and Air Protection) Environmental Risk Assessment (ERA): *An Approach for Assessing and Reporting Environmental Conditions* (July, 2000). Risk is defined as "the probability of an adverse event occurring," such as a decrease in wildlife habitat and populations. The evaluation procedure involves several steps, including:

- Identifying the environmental values and the key indicators used to describe impacts on such values;
- Identifying the cause-effect linkages between Crown land management and key environmental values; and
- Estimating the biophysical risks of the plan and/or scenarios on the identified uses and values versus those of the base case (including the ability of environmental values to recover after any contemplated unnatural disturbance ceases).

The net environmental benefits should be quantified using measures of risk assessment. Where practical, a monetary value should be applied to the risk assessment to help estimate the net benefit associated with each option, using methods such as willingness to pay and value transfer. In some instances, it may be appropriate to convert the risk assessment to a rating system so that the indicator may be weighted and compared to the indicators in the other areas of research through a Multi-Attribute Trade-off Analysis.

While attempting to quantify environmental outcomes is important, where quantitative outcomes are too uncertain, the analysts should assess how large the net present value of the environmental impacts would need to be to change the relative attractiveness of the land use scenarios.

The intent of these Guiding Principles is to focus on the methodologies for assessing the socio-economic impacts, rather than for assessing environmental impacts. Further analysis of issues relating to the assessment of environmental impacts may result in additional Guiding Principles.

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2.7 Aboriginal Community

The Aboriginal communities and non-aboriginal communities depend on many of the same land based resources in a Plan Area, e.g. wildlife, fisheries, forestry, mining, tourism, etc. As a result, aboriginal concerns should be addressed within the various research areas including the social, economic development and net benefit areas of research.

Aboriginal communities also have very strong attachments to the land from a cultural, traditional and spiritual perspective and there may be some specific aboriginal concerns that are not addressed in the social and economic development areas of research. Aboriginal values, rights and circumstances are often quite different than those of the rest of the population. Addressing some specific Aboriginal concerns separately from the concerns of other communities is typically appropriate. While this may foster a perception that Aboriginal concerns are in conflict with other interests, it also forces analysts to specifically consider the potential impacts on Aboriginal communities.

2.8 Government Finances

The SEEA should document the impact of the plan and/or each land and resource management scenario on provincial government revenues and expenditures. This involves:

- Estimating the impacts of each management scenario on provincial government revenues;
- Estimating the impacts of each management scenario on provincial government expenditures; and,
- Calculating the net financial effect on the provincial government.

The impacts on government revenues should focus on government revenues directly generated from resource use. These include:

- Stumpage fees, royalties and other fees for harvesting crown timber;
- Taxes, royalties, bonus bids and other fees for accessing sub-surface resources (i.e. coal, minerals and petroleum);
- Tourism and recreation fees; and
- Other direct taxes and revenues from other sectors as may be appropriate.

General income tax and sales tax effects of the management scenarios can also affect provincial government revenues. These are much more difficult to estimate than the direct resource related impacts, as such effects may not be incremental, particularly if capital and labour affected by each scenario are, or can be employed elsewhere in the province. Moreover, employment level changes which result in population changes may have somewhat offsetting impacts on tax revenues and government service expenditures.

In general, the SEEAs should not include estimates of personal income and sales tax revenues, but analysts who choose to do so, need to clearly distinguish these from resource tax related revenue effects, and explicitly address the issue of incrementality.

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2.9 Stakeholder Preferences

SEEAs do not document stakeholder preferences as they intend to be value-neutral and science-based. In SEEAs, stakeholder input that is technically defensible is incorporated into the various areas of research that document impacts on key values. There may be reasons, however, to better document stakeholder preferences as part of the land use planning process:

- Land use planning processes that rely more on consultation than consensus may require specific documentation of stakeholder preferences to more fully inform decision makers of the trade-offs involved in a decision.
- There may be governance issues associated with stakeholder preferences in that the success of a land use plan may depend on the support of the local community.
- Documenting stakeholder preferences can help ensure that socio-economic impacts and the general well being of individuals are fully accounted for in the assessment.

While there may be reasons for decision makers to gain a good sense of stakeholder preferences, documenting stakeholder preferences cannot substitute for rigorous socio-economic and environmental assessment:

- Stakeholder preferences may not always favour efficient use of Crown resources. It is therefore important to compare stakeholder preferences with the other assessment measures, notably the Net Resource Value indicator.
- Relying substantially on stakeholder preferences would assume that stakeholder groups effectively represent all resources and interests, which is not usually the case.

Documenting stakeholder preferences involves seeking input from stakeholders through some form of public process, requesting and reviewing stakeholder submissions and preparing summaries of the information. Multi-Attribute Trade-off Analysis (MATA) can be useful in documenting stakeholder preferences and in demonstrating how individuals applying different weights to the same set of criteria ratings can reach different conclusions. While the documentation of stakeholder preferences and the SEEA could ultimately be combined in a single decision document, they are initially separate exercises and should be treated as such.

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